BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

As rescanning documents *will not* correct images, please do not report the images to the Image Problem Mailbox.

1,175,850

PATENT SPECIFICATION

NO DRAWINGS

Inventor: NOEL SPENCER DEAN

1,175,850

Date of filing Complete Specification: 6 Sept., 1968.

Application Date: 7 Sept., 1967. No. 40974/67.

Complete Specification Published: 23 Dec., 1969.

Index at acceptance: —H1 A(1C, 2E3D2, 3G, 6S, 16)

International Classification: —H 01 b 7/28

COMPLETE SPECIFICATION

Improvements in or relating to Telecommunication Cables

We, BRITISH INSULATED CALLENDER'S CABLES LIMITED, a British Company, of 21 Bloomsbury Street, London, W.C.1., do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to telecommunication cables of the kind comprising a multiplicity of plastics insulated conductors enclosed within a water-proof sheath of plastics material. More especially but not exclusively it is concerned with so-called "pilot and telephone" cables. Pilot and telephone cables are usually laid alongside the power cable or cables of the circuit or circuits with which the pilot cores are associated and in consequence lengths of such pilot and telephone cables often form part of an indoor cable installation. In order to minimise the risk of such cables transmitting flame in the event of a fire in a part of the installation to which they have access, the conductor insulation and the sheath are commonly of polyvinyl chloride compositions as such compositions will not propagate flame although they will melt or burn away if subjected to high temperatures.

With the object of limiting the extent to which water that has entered a telecommunication cable through a defect in the cable sheath or in a joint in the cable may travel along the cable, we have in the specifications of our Patents Nos. 995,582, 1,095,639 and 1,104,450 proposed to fill the interstices between cellular plastics insulated conductors and between them and the cable sheath from end to end of the cable length with petroleum jelly or other water-impermeable medium which will not drain under the influence of gravity or such hydrostatic pressure as may arise in the event of damage to the cable sheath but which will permit relative sliding movement of the cellular plastics insulated conductors over one another during such bending of the cable as occurs during manufacture and installation of the cable. Telecommunication cables having solid or cellular insulated conductors with the interstices so filled are now known as "fully-filled" cables and will hereinafter be referred to as such.

While fully filling a cable with petroleum jelly reduces the risk of its electrical characteristics being adversely affected by penetration of water through a damaged sheath or a faulty joint, it has the disadvantage that it may very substantially reduce or even eliminate the flame retarding characteristics of the cable so that fully-filled pilot and telephone cables become a fire hazard.

It is an object of the invention to provide a fully-filled plastics insulated and plastics sheathed telecommunication cable which is free or substantially free from the aforesaid disadvantage.

In accordance with our invention we achieve the object by using as the material for filling the interstices between the insulated conductors and between the insulated conductors and the plastics sheath a flame-resistant, water-impermeable medium which will not at normal operating temperatures of the cable drain under the influence of gravity or such hydrostatic pressure as may arise in the event of damage to the cable sheath but which will permit relative sliding movement of the plastics insulated conductors over one another during such bending of the cable as occurs during manufacture and installation of the cable.

In this specification the term "flame-resistant medium" is used to mean a medium which, when a portion thereof is subjected to the influence of an external source of ignition, will not transmit flame beyond the portion of

[*Price 4s. 6d.*]

the medium under the influence of the source of ignition and will not continue to burn after being removed from the source of ignition.

The composition used to fill the interstices within the cable should also be compatible with the particular insulating material used to insulate the individual conductors and with the material of the sheath, and should have a high coefficient of bulk resistivity, a high dielectric strength and preferably a low permittivity.

Filling media suitable for use in cables whose conductors are insulated with solid or cellular polythene, solid or cellular polypropylene or solid or cellular polyvinyl chloride compositions are blends of

(a) combustible oils and/or waxes with
(b) flame resistant media.

Examples of (a) are:—

(1) Mixtures of whiting and castor oil.
(2) microcrystalline petroleum waxes
(3) mixtures of microcrystalline petroleum waxes and oils, for instance, petroleum jelly
(4) low molecular weight, high Melt Flow Index polyethylenes of a semi-solid or greaselike nature
(5) mixtures of petroleum jelly, microcrystalline petroleum waxes, polyisobutylene and aluminium stearate
(6) mixtures containing cumerone indene resins.

Examples of flame resistant media are:—

(1) Chlorinated paraffin wax
(2) Halogenated diphenyl e.g. chlorinated diphenyl.

The invention will now be illustrated by means of the following Examples.

Example I

A fully filled telecommunication cable for use in a carrier system comprises a multiplicity of conductors, each having a dielectric of a cellular polyethylene or cellular polypropylene enclosed in a solid polyethylene or polypropylene sheath. Although the conductors may be twinned, or otherwise assembled together we prefer to arrange them in quads as this results in a smaller aggregate volume of interstices within the cable as compared with a cable having the same number and size of conductors associated in pairs.

By making the insulation of the conductors of cellular material, the capacitance between the conductors of each pair or quad is reduced to an extent so as substantially to compensate for the increased capacitance due to the presence of the filling compound.

The filling composition that we prefer to use is a blend of petroleum jelly and a halogenated paraffin wax or a mixture of such paraffin waxes. Of the halogenated paraffin waxes, chlorinated paraffin wax is particularly suitable on account of its cheapness and availability.

Example II

A fully filled pilot and telephone cable comprises a multiplicity of conductors each having a dielectric of solid polyvinyl chloride enclosed in a solid polyvinyl chloride sheath. The conductors may be twinned or laid singly.

Likewise, as in Example I the filling composition we prefer to use is a blend of petroleum jelly and a halogenated paraffin wax or mixture of such paraffin waxes, chlorinated paraffin wax being particularly suitable.

Example III

A fully filled pilot and telephone cable comprises a multiplicity of conductors each having a dielectric of solid polypropylene enclosed in a solid polyethylene or solid polypropylene sheath.

The arrangement of the conductors and the preferred filling composition are identical to Example II.

The cables, described in the above examples, may be manufactured by the methods described in the specifications of our Patents Nos. 1,120,011, 1,104,450 and 995,582.

WHAT WE CLAIM IS:—

1. A telecommunication cable comprising a multiplicity of plastics insulated conductors enclosed within a waterproof sheath of plastics material and, filling the interstices between the insulated conductors and the insulated conductors and the sheath, a flame resistant water impermeable medium which will not, at normal operating temperatures of the cable, drain under the influence of gravity or such hydrostatic pressure as may arise in the event of damage to the cable sheath but which will permit relative sliding movement of the plastics insulated conductors over one another during such bending of the cable that occurs during manufacture and installation of the cable.

2. A telecommunication cable comprising a multiplicity of cellular plastics insulated conductors enclosed within a waterproof sheath of plastics material and, filling the interstices between the insulated conductors and the insulated conductors and the sheath, a flame resistant water impermeable medium which will not, at normal operating temperatures of the cable, drain under the influence of gravity or such hydrostatic pressure as may arise in the event of damage to the cable sheath but which will permit relative sliding movement of the plastics insulated conductors over one another during such bending of the cable that occurs during manufacture and installation of the cable.

3. A telecommunication cable comprising a multiplicity of plastics insulated conductors enclosed within a waterproof sheath of plastics material and, filling the interstices between the insulated conductors and the insulated conductors and the sheath, a flame resistant water

impermeable medium which will not, at normal operating temperatures of the cable, drain under the influence of gravity or such hydrostatic pressure as may arise in the event of damage to the cable sheath but which will permit relative sliding movement of the plastics insulated conductors over one another during such bending of the cable that occurs during manufacture and installation of the cable, said flame resistant water impermeable medium comprising a blend of a flame resistant medium and a water impermeable medium.

4. A telecommunication cable comprising a multiplicity of flame resistant plastics insulated conductors enclosed within a waterproof sheath of flame resistant plastics material and, filling the interstices between the insulated conductors and the insulated conductors and the sheath, a flame resistant water impermeable medium which will not, at normal operating temperatures of the cable, drain under the influence of gravity or such hydrostatic pressure as may arise in the event of damage to the cable sheath but which will permit relative sliding movement of the plastics insulated conductors over one another during such bending of the cable that occurs during manufacture and installation of the cable.

5. A telecommunication cable according to Claim 3 wherein said plastics insulation is of cellular form.

6. A telecommunication cable according to Claim 3 or Claim 5 wherein said plastics insulation comprises polyethylene or polyvinyl chloride or polypropylene.

7. A telecommunication cable according to any of Claims 3, 5 or 6 wherein said flame resistant medium comprises at least one halogenated paraffin wax.

8. A telecommunication cable according to any of Claims 3, 5 or 6 wherein said flame resistant material comprises a halogenated diphenyl.

9. A telecommunication cable according to any of Claims 3, 5, 6, 7 or 8 wherein said water impermeable medium is a mixture of whiting and castor oil.

10. A telecommunication cable according to any of Claims 3, 5, 6, 7 or 8 wherein said water impermeable medium comprises a microcrystalline petroleum wax.

11. A telecommunication cable according to any of Claims 3, 5, 6, 7 or 8 wherein said water impermeable medium comprises a mixture of microcrystalline petroleum waxes and oils.

12. A telecommunication cable according to any of Claims 3, 5, 6, 7 or 8 wherein said water impermeable medium comprises a low molecular weight, high Melt Flow Index polyethylene of a semi-solid or grease-like nature.

13. A telecommunication cable according to any of Claims 3, 5, 6, 7 or 8 wherein said water impermeable medium comprises mixtures of petroleum jelly micro-crystalline petroleum waxes, polyisobutylene and aluminium stearate.

14. A telecommunication cable according to any of Claims 3, 5, 6, 7 or 8 wherein said water impermeable medium comprises mixtures containing cumerone indene resins.

15. A telecommunication cable comprising a multiplicity of plastics insulated conductors enclosed within a waterproof sheath of plastics material and, filling the interstices between the insulated conductors and the insulated conductors and the sheath, a flame resistant water impermeable medium which will not, at normal operating temperatures of the cable, drain under the influence of gravity or such hydrostatic pressure as may arise in the event of damage to the cable sheath but which will permit relative sliding movement of the plastics insulated conductors over one another during such bending of the cable that occurs during manufacture and installation of the cable, said flame resistant water impermeable medium comprising a blend of chlorinated paraffin wax and petroleum jelly.

16. A telecommunication cable according to Claim 1 or Claim 2 wherein said plastics insulation comprises polyethylene or polyvinyl chloride or polypropylene.

17. A telecommunication cable according to Claim 4 wherein said flame resistant plastics insulation and said flame resistant plastics material comprise polyvinyl chloride.

18. A telecommunication cable substantially as hereinbefore described with reference to Example I.

19. A telecommunication cable substantially as hereinbefore described with reference to Example II.

20. A telecommunication cable substantially as hereinbefore described with reference to Example III.

R. F. TARBOX,
Agent for the Applicant,
21, Bloomsbury Street, London, W.C.1.

Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1969.
Published by the Patent Office, 25, Southampton Buildings, London, W.C.2, from which copies may be obtained.